

UNITED NATIONS Office on Drugs and Crime



# PERU

# **Coca Cultivation Survey**



June 2005

#### Abbreviations

ENACO	National Coca Enterprise
GIS	Geographical Information Systems
GPS	Global Positioning System
ICMP	UNODC Illicit Crop Monitoring Programme
DIRANDRO	Anti-Drugs Directorate, Peruvian National Police
OFECOD	Drug Control Office, Peruvian Ministry of Interior
NAS	Narcotics Affairs Section, United States Embassy
UNODC	United Nations Office on Drugs and Crime
CONTRADROGAS	Committee for the Fight Against Drug Consumption
DEVIDA	National Commission for Development and Life without Drugs
CORAH	Control and Reduction of Coca Leaf in Upper Huallaga

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This report and other ICMP survey reports can be downloaded from:

www.unodc.org/unodc/en/crop\_monitoring.html

#### PREFACE

Last year, we reported that Peru's area under coca cultivation in 2003 had dropped 5.3 percent compared to the previous year. We avoided complacency and instead warned about the possibility of a resurgence in coca surface and an increase in coca bush productivity. More importantly, we urged the Peruvian Government not to lower its guard and advocated for more international support to co-fund sustainable livelihood programmes.

In 2004, Peru's coca surface grew faster than at any other time in the past ten years. Compared to 2003, the total area under cultivation rose by 14 percent to 50,300 hectares whilst potential cocaine production jumped an estimated 23 percent to 190 metric tons. Peru still trails Colombia but now accounts for close to one third of world cocaine production.

Ominously, the country lost all the hard-won gains it had achieved since the UN General Assembly Special Session on Drugs (UNGASS) held in 1998, when surface stood at 51,000 hectares. By the UNGASS yardstick, Peru is back to square one. This is neither the case in Colombia nor Bolivia, both reporting less illicit crops than 7 years ago.

The resurgence of coca in Peru is fuelled mainly by two interconnected factors: insufficient government attention paid to key growing areas and the high prices paid to farmers for coca leaf in these areas. In a country where less than 10 percent of coca is used for traditional purposes (infusions, chewing), an increase in illicit coca means even more addiction, deeper corruption, and more resources to finance terrorism. Although the Peruvian people will pay the brunt of this negative scenario, it would be unwise to ignore the regional and global ramifications in terms of health, crime and security. It is a safe bet that international criminal groups operating in Peru are determined to further expand cocaine markets in Europe, North America and other regions.

Up to the mid-1990s, Peru was the world's foremost coca producer. Could it be staging a comeback? Not necessarily. We believe there still is time to reverse the trend.

First, because nearly the entire coca increase in 2004 was concentrated in two areas notorious for the absence of the rule of law and the lack of development programmes. Encouragingly, coca surface remained relatively stable in the other six main growing areas, all of which benefit from sustainable livelihood programmes of some sort. Such correlations offer reasons for optimism.

Second, because Peru can point to numerous alternative livelihoods schemes that in the past have replaced the coca-cocaine industry with legal farming economies and commercially viable enterprises. Regrettably, only 11 percent of Peruvian farmers dependent on coca nowadays have real access to sustainable livelihood activities, due to lack of national and international funding. But this should not obscure the fact that the programmes that actually have been implemented are a successful tool for drug control and development. Looking at UNODC's portfolio of activities alone, farmers enterprises sold in 2004 about US\$ 36 million worth of specialty coffee, organic cocoa and palm oil, mostly in export markets. The social and economic impact of the entire sustainable development programme in Peru is of course much broader.

Third, because Peru remains a country where the overwhelming majority of farmers would readily abandon illicit markets if offered viable alternatives to escape extreme poverty. Equally important, Peruvian public opinion would most certainly support any administration with credible policies aimed at stamping out the corruption, urban insecurity and human misery generated by drug trafficking. We believe these are powerful allies.

Peru should not squander its assets. It cannot afford to let international organized crime consolidate its position in the country. The United Nations Office on Drugs and Crime urges the Peruvian Government to implement more vigorously its national drug control strategy, assigning particular importance to the empowerment of all relevant national entities and decentralized local governments to fight illicit drug production, trafficking and abuse. We also call on donors and the international financial institutions to focus more sharply on the perverse effects of drugs, crime and terrorism on the country's prospects for poverty reduction, rule of law and sustainable development. Peru also needs much more support to deliver sustainable development opportunities in illicit crop areas, involving the private sector in initiatives aimed at increasing lawful employment, production and productivity. It is equally important for the main cocaine consumer markets in the Americas and Europe to strengthen their demand reduction efforts.

Antonio Maria Costa Executive Director

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		2003	Variation on 2003	2004
Coca cultivation		44,200 ha	+ 14 %	50,300 ha
Of which in	Alto Huallaga	13,600 ha	+ 24 %	16,900 ha
	Apurimac-Ene	14,300 ha	+3%	14,700 ha
	La Convencion y Lares	12,340 ha	+3%	12,700 ha
	Elsewhere	3,940 ha	+ 52 %	6,000 ha
Average sun-dr	ed coca leaf yield from UNODC study	r in 2004		
In Alto Huall	aga (except Monzon)			2,988 kg/ha
In Apurimac-	Ene			3,627 kg/ha
In La Conve	ncion y Lares			1,457 kg/ha
Weighted avera	ge sun-dried coca leaf yield	1,650 kg/ha	+ 32 %	2,180 kg/ha
Potential produc	ction of sun-dried coca leaf	72,800 mt	+ 50 %	110,000 mt
Potential produc	ction of cocaine hydrochloride	155 mt	+ 23 %	190 mt
in percent of	world illicit cocaine production	23 %		28 %
Average farm-g	ate price of sun-dried coca leaf	US\$ 2.2/kg	+ 27 %	US\$ 2.8/kg
Potential farm-g	ate value of sun-dried coca leaf <sup>1</sup>			US\$ 304 million
GDP (Peru Nati	onal Statistics Institute)			US\$ 68.5 billion
Farm-gate value percentage of G	ie of coca leaf production as DP			0.44%
Average farm-g	ate price of coca paste	US\$ 530/kg	+21 %	US\$ 640/kg
Reported eradio	cation of coca cultivation	11,312 ha	- 9 %	10,257 ha
Reported seizur	e of cocaine paste	4,366 kg	+ 44 %	6,330 kg
Reported seizur	e of cocaine hydrochloride	3,574 kg	+ 104 %	7,303 kg
Reported opium	poppy cultivation	n.a.		1,447 ha
Reported seizur	e of opium latex	433 kg	+4%	451 kg

#### FACT SHEET – PERU COCA SURVEY FOR 2004

<sup>&</sup>lt;sup>1</sup> Farm-gate value for 2004 was calculated based on coca leaf yield data obtained by UNODC in 2004. In 2003, farmgate value for 2003 was estimated using coca leaf yield dating 2001. The total farm-gate value for 2001 and 2004 were therefore not directly comparable.

# EXECUTIVE SUMMARY

Under its global Illicit Crop Monitoring Programme, UNODC has been assisting the Peruvian Government in the implementation and refinement of a national coca monitoring system since 1998. The present report presents the findings of the Coca Cultivation survey for 2004.

In 2004, the total area under coca cultivation in Peru was estimated at 50,300 ha. This represented an increase of 14% over 2003's estimate of 44,200 ha. Despite this increase, coca cultivation in 2004 remained below the levels registered in the mid-nineties, when cultivation rose above 100,000 ha.

The main motivation of the farmers to increase coca cultivation might have been the sustained high prices for coca leaf. Since 2000, the prices have remained above US\$ 2/kg, compared to 1996 and 1997 when prices fell below US\$ 1/kg.

The increase in coca cultivation noted in 2004 mostly took place in the Alto Huallaga region and in San Gaban. Increases in these two regions accounted for 90% of the total increase of 5,500 ha between 2003 and 2004. For the first time in 2004, a total of 1,300 ha of coca fields were detected in the northern part of the Alto Huallaga valley, around the Mishollo river and Puerto Pizana village. In 2004, the northern part of the Alto Huallaga recorded the second largest area under coca cultivation in Alto Huallaga, after Monzon. In Alto Huallaga, the increase in coca cultivation of 3,300 ha between 2003 and 2004 was mainly on land that was protected or devoted to forestry activities. Outside the Alto Huallaga region, an important increase was also noted in the remote district of San Gaban (+ 2,200 ha) where coca cultivation appeared for the first time less than five years ago. A possible explanation for the increase in San Gaban could be its proximity to Bolivia where coca leaf prices are higher.

In 2004, UNODC conducted coca leaf field study in 55 plots of 13 fields in three regions of Peru: Alto Huallaga (except Monzón), Apurimac-Ene, La Convención y Lares. The analysis of the data revealed that Apurimac-Ene (3,627 kg/ha) had the highest annual sun-dried coca leaf yield, followed by Alto Huallaga (except Monzón) (2,988 kg/ha) and La Convención y Lares (1,457 kg/ha). These yield estimates were considerably higher than the yields measured by UNODC in 2001 and corroborate field reports that farmers have improved their field management practices. The total sun-dried coca leaf production in 2004 for Peru ranged between 96,000 and 123,000 metric tons. Taking into account an 9,000 metric tons for traditional, commercial or industrial uses, the total production of sun-dried coca leaf for cocaine production was estimated at around 101,000 metric tons, equivalent to an oven-dried<sup>2</sup> coca leaf production of about 76,500 metric tons (+/- 12%). Based on a conversion rate of 375 kg of oven-dried coca leaf for 1 kg of cocaine, the potential production of 190 metric tons. It represented 28% of the global potential cocaine production of 687 metric tons in 2004.

In 2004, the gross potential farm-gate value of the sun-dried coca leaf production amounted to US\$ 304 million, based on 107.4 metric tons sold at US\$ 2.8/kg on the unregulated market and 2.6 metric tons sold at US\$ 1.4/kg on the market regulated by ENACO.

The comparison of district poverty indicators of 2000 with level of coca cultivation in 2004 clearly showed that districts where coca cultivation was found in 2004 were poorer than other districts. On average, districts where coca cultivation was found were qualified as 'very poor'. By contrast, districts without coca cultivation were on average defined as 'poor'. This meant that coca cultivating districts had, *inter alia*, less access to safe drinking water, sanitation and electricity than districts with no coca cultivation.

In 2004, the Peruvian government reported the eradication of 10,257 ha of coca fields, 10% less than in 2003. Despite the decrease, it remained the third largest level of eradication since 1999.

<sup>&</sup>lt;sup>2</sup> Assuming an average 57% moisture content of sun-dried leaf and 70% moisture content of oven-dried leaf

# **1** INTRODUCTION

In response to the decisions of the 1998 United Nations General Assembly Special Session on Drugs, UNODC developed and implemented a global Illicit Crop Monitoring Programme (ICMP). Through this programme, UNODC supports member states in establishing a crop monitoring system to monitor illicit cultivation of coca and opium poppy. The Programme is currently operating in Afghanistan, Myanmar, Laos, Colombia, Peru, Bolivia and Morocco.

In 1998, UNODC started working with DEVIDA to develop a national coca monitoring system in Peru. Using aerial photography, the project produced a detailed mapping (at 1/20,000 scale) of all the coca cultivation areas in 2000. Every year since then, satellite images were used to update the estimates. This report presents the findings of the 2004 Survey.

In Peru, the General Law on Drugs enacted in 1978 prohibits the cultivation of coca and seedlings in new areas within the national territory. This reference to "cultivation" includes the grafting and renovation of existing coca bushes. In 1978, another law established the National Coca Enterprise (ENACO), which has a monopoly on the commercialization and industrialization of the coca leaves. Therefore, the selling of coca leaves to any party other than ENACO is considered illicit by national law.

The Government also established in 1996 a Committee for the Fight Against Drug Consumption (CONTRADROGAS), renamed National Commission for Development and Life without Drugs (DEVIDA) in 2001. DEVIDA's objectives are to design, coordinate and implement policies and activities aimed at national drug control.

Until the mid-1990's, Peru was the world's main coca cultivating country. Today, it is the second major producer of coca far behind Colombia.

The reduction in coca cultivation in Peru in the mid-1990's was linked to the sharp decline in both the coca leaf prices and the demand for Peruvian coca leaf. In 1995, trade in coca leaf on the local market ceased and, from 1996 to 1998, the prices of coca leaf remained lower than its production costs. Farmers abandoned their coca fields and coca cultivation dropped from 115,300 ha to 38,700 ha, or 66%, between 1995 and 1999.

After 1999, coca prices increased slowly while the prices of licit crops (coffee and cacao) decreased. Farmers started to re-activate their abandoned coca fields and coca cultivation rose again in Peru. To some extent, the increase has been contained by the presence of alternative development projects, as well as the introduction of eradication measures, which include both forced eradication conducted by CORAH (Ministry of Interior) and voluntary eradication schemes conducted by DEVIDA.

# 2 FINDINGS

# 2.1 COCA CULTIVATION

In 2004, the total area under productive coca cultivation in Peru was estimated at 50,300 ha. This represented an increase of 14% over the estimate for 2003 of 44,200 ha. Despite this increase, coca cultivation in 2004 remained below the levels registered in the mid-nineties, when cultivation was above 100,000 ha.





Table 1:	Coca cultivation in Peru,	1994 - 2004 (	(ha)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Rounded total	108,600	115,300	94,400	68,800	51,000	38,700	43,400	46,200	46,700	44,200	50,300

Sources United States Department of States

National Monitoring System Supported by UNODC

The main motivation for the farmers to increase coca cultivation might be the sustained high prices for coca leaf. Since 2000, the prices remained above US\$ 2/kg, compared to prices below US\$ 1/kg in 1996 and 1997. The further strengthening of the prices in 2004, averaging US\$ 2.8/kg, could act as a incentive for more cultivation in the future.

It should be noted that in 2004, like in the previous surveys, the detected coca fields were more than one year old since it takes about 12 months for a coca field to develop a sufficient vegetation cover to be detected on satellite images like SPOT. About one year after planting , the first harvest can take place. Therefore, the 2004 survey accounted for all productive coca fields but coca fields of less than one year old in 2004 will only be seen in the next survey.



Source: Government of Peru - National monitoring system supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations The increase in coca cultivation noted in 2004 mostly took place in the Alto Huallaga region and in San Gaban. The increase in these two regions accounted for 90% of the total increase of 5,500 ha between 2003 and 2004.

In Alto Huallaga, a region where coca cultivation has long been established, cultivation reached 16,900 ha or 34% of the total in Peru. Between 2003 and 2004, coca cultivation in Alto Huallaga increased by 3,300 ha, of 24% compared to the 2003 level of 44,200 ha. 56% of this increase mainly took place at the expenses of land which according to the definition of the National System of Land Classification should rather be protected or devoted to forestry activities.

Most of the cultivation in Alto Huallaga continued to take place in the Monzon valley that alone accounted for 11,320 ha or 67% of the total of the region in 2004. In that valley, coca cultivation increased by 650 ha, or + 6% between 2003 and 2004. Like in 2003, the insecurity and violence brought about in Monzon in 2004 by organizations of coca farmers were constant, preventing the local authorities and UNODC personnel of alternative development projects from entering the valley.

For the first time in 2004, a total of 1,300 ha of coca fields were also detected in the northern part of the Alto Huallaga valley, around Mishollo river and Puerto Pizana village. In 2004, the northern part of the Alto Huallaga constituted the second centre of coca cultivation in Alto Huallaga, after Monzon. The important number of coca seedlings and newly prepared fields observed in this area in 2004, would indicate that coca cultivation could still increase in the future.

Outside the Alto Huallaga region, an important increase was also noted in the remote district of San Gaban (+ 2,200 ha) where coca cultivation only appeared less than five years ago. The level of cultivation in San Gaban reflected the situation as of 3<sup>rd</sup> September 2004, corresponding to the date of the acquisition of the satellite images. The outcome of the Government's eradication under the programme CORAH, conducted from October to December 2004 and reported at 1,500 ha, will be shown in next year survey.

The increase in San Gaban district of Puno department was probably triggered by the prices for coca leaf established at an average of US\$ 2.8 /kg in 2004. The region is also close to Bolivia where coca leaf prices fetched an average of US\$ 4.8/kg in 2004, making the export of coca leaves a lucrative business. The cross-border business of coca leaves was also evidenced by the increase in seizure of Peruvian coca leaves at the Bolivian border post of Desaguadero, close to Puno department. By contrast, the region of Inambari-Tambopata, also close to the Bolivian border but where an alternative development project is operating, showed a slight decrease in coca cultivation between 2003 and 2004.



Sources: Governments of Bolivia, Colombia y Peru, National monitoring systems supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

In 2004, coca cultivation in Peru was the second largest after Colombia. It represented 33% of the 2004 global coca cultivation, compared to 29% in 2003. A percentage that remained much lower than ten years ago, when coca cultivation in Peru accounted for 54% of the cultivation in the world. However, the increases in coca cultivation in Peru and Bolivia in 2004 contributed to the stabilization of the global coca cultivation at level comparable to 2003 despite the reduction noted in Colombia.





Table 2:	Coca cultivation in the Andean region, 1	1994-2004 (	(ha	)
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	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	% change 2003- 2004
Bolivia	48,100	48,600	48,100	45,800	38,000	21,800	14,600	19,900	24,400	23,600	27,700	17%
Peru	108,600	115,300	94,400	68,800	51,000	38,700	43,400	46,200	46,700	44,200	50,300	14%
Colombia	45,000	51,000	67,000	79,000	102,000	160,000	163,000	145,000	102,000	86,000	80,000	-7%
Total	201,700	214,900	209,500	193,600	191,000	220,500	221,000	211,100	173,100	153,800	158,000	3%

Sources

United States Department of States

National Monitoring Systems Supported by UNODC



Source: Government of Peru - National of monitoring system supported by UNODC

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

#### 2.1.1 REGIONAL ANALYSIS

In Peru, most coca cultivation is concentrated in 14 large valleys and 8 smaller valleys. These valleys can be grouped in three main regions, making up 88% of the total cultivation in 2004: Alto Huallaga, Apurimac-Ene and La Convención y Lares. Each region has its own characteristics: While La Convención y Lares is the main supplier of the domestic consumption of coca leaf, coca cultivation in Apurimac-Ene and Alto-Huallaga are almost exclusively oriented for the production of cocaine for domestic and international markets.

Coca cultivation in others areas like San Gaban and Inambari-Tambopata at the border with Bolivia, Aguaytía and Palcazu- Pichis- -Pachitea in the central part of the country, and Putumayo of Loreto department close to Colombia, only accounted for 12% of the 2004 total. Coca cultivation in these areas has mainly been oriented towards the production of cocaine.

Altogether, in 2004 coca cultivation could be found at various levels in 12 out of the 24 departments of Peru (Cajamarca, Amazonas, La Libertad, San Martín, Loreto, Huanuco, Ucayali, Pasco, Junin, Ayacucho, Cusco and Puno).





Table 3:	Coca cultivation estimates by region, 2001 – 2004	(ha)
10010-0.		nu)

Region	2001	2002	2003	2004	Change 2003 – 2004	% of 2004 total
Alto Huallaga	14,481	15,286	13,646	16,900	3,254	34%
Apurimac-Ene	12,600	14,170	14,300	14,700	400	29%
La Convención - Lares	13,980	12,170	12,340	12,700	360	25%
San Gaban	n.a.	n.a.	470	2,700	2,230	5%
Inambari - Tambopata	2,520	2,430	2,260	2,000	-260	4%
Aguaytía	1,051	1,070	510	500	-10	1%
Marañon, Putumayo	1,250	1,250	450	500	50	1%
Palcazu - Pichis - Pachitea	350	350	250	300	50	1%
Rounded Total	46,200	46,700	44,200	50,300	6,100	100%

Source: National monitoring system supported by UNODC



Coca cultivation density in Alto Huallaga, 2004

Source: Government of Peru - National monitoring system supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

# 2.1.1.1 Coca cultivation in Alto Huallaga

The Alto Huallaga region is located on the Eastern side of the Andes mountain range, in the high tropical or subtropical forests of the departments of San Martin and Huanuco. The altitude of the area studied ranges between 400 and 1,400 meters above sea level. Deforestation is important in the region and mostly due to agricultural exploitation of land that should rather be protected or devoted to forest or forestry activities.

The Alto Huallaga is one of the three main coca growing regions of Peru where coca cultivation has long been established. The 16,900 ha estimated in 2004 accounted for 34% of the national total, making of Alto Huallaga the main centre of coca cultivation in Peru in 2004, ahead of Apurimac and La Convención y Lares.

ENACO, the national state company in charge of the commercialization of coca leaves for medicinal and traditional uses, is only present in Alto Huallaga in the city of Uchiza. It purchased very little of the 2004 coca harvest at an annual average price US\$ 1.5/kg, a much lower price than the US\$ 2.8/kg offered for coca leaf destined for cocaine processing. The bulk of the coca leaves production of the region was meant for cocaine processing.

Coca growing areas	2002	2003	2004	% change 2003-2004	% of 2004 total
Monzon	10,935	10,659	11,325	6%	67%
Tulumayo	1,438	1,188	1,507	27%	9%
Pendencia – Aucayacu	1,147	560	711	27%	4%
Aspuzana	488	373	335	-10%	2%
Cuchara - Madgalena - S. Marta - Camote – Frijol – Yanajanca – Huanuco	587	510	1,080	112%	6%
Tocache – Chontayacu	691	356	677	90%	4%
Mishollo			408	n.a.	2%
Puerto Pizano			908	n.a.	5%
Rounded total for Alto Huallaga	15,300	13,600	16,900	24%	100%

Table 4: Coca cultivation in the valleys of the Alto Huallaga region, 2002 – 2004 (ha)

Figure 4. Coca cultivation in the valleys of the Alto Huallaga region, 2002 – 2004 (ha)



#### Peru Coca Survey for 2004

Between 2003 and 2004 coca cultivation increased by a significant 24% in Alto Huallaga. The raise of 3,300 ha between 2003 and 2004, represented 53% of the national annual increase of 6,100 ha. The increase was mainly located in the northern part of the Alto Huallaga, in particular around the borders of Mishollo's river, Puerto Pizana, where coca cultivation reached significant levels for the first time in 2004. In these areas coca cultivation totalled 1,300 ha and representing 40% of the regional increase in Alto Huallaga between 2003 and 2004. The recent emergence of coca cultivation in these areas is well illustrated in the following pictures showing SPOT images taken in 2002 and 2004.



SPOT4 2002 Sector Mishollo - Pto. Pizana

SPOT5 2004 Sector Mishollo – Pto. Pizana

A strong increase of 90% in coca cultivation between 2003 and 2004 was also noted in the neighbouring area of Tocache, in the districts of Bambamarca and Pucayacu. In Pucayacu, new coca fields often alternated with old plantations of palm oil trees.



Puerto Pizana, recently planted coca fields, March 2005



Bambamarca Pucayacu, recently planted coca fields, March 2005

An increase in coca cultivation was also observed in Yanajanca and Huamuco areas, making the northern part of Alto Huallaga a new centre of coca cultivation in the region. The following pictures shows the important increase between 2003 and 2004 in this area.



SPOT 5 – 2003 Sector Yanahanca – Huamuco

SPOT5 - 2004 Sector Yanahanca – Huamuco

Since 1996, coca leaf prices have gradually and generally increased, from US\$ 0.6/kg in 1996 to US\$ 2.8/kg in 2004. Lately, this overall increasing trend motivated the farmers to invest in the establishment of new coca fields. The destruction of coca seedlings in March 2005 by CORAH in Huamuco was an indication that farmers continued to establish new fields and that coca cultivation might further increase in the region.



Yanajanca – Huamuco, recently planted coca fields, March 2005

#### Peru Coca Survey for 2004

Despite the strong increase in coca cultivation in the northern part of Alto Huallaga, coca cultivation in 2004 remained mostly concentrated in the Monzón valley which accounted for 11,320 ha or 67% of the total cultivation in Alto Huallaga in 2004. Most of Monzón valley is made of steep slopes of poor soils subject to erosion. This is where coca cultivation predominantly takes place, and at this high altitudes is almost the only crop cultivated. In the bottom of the valley, coca fields alternate with other crops like maize, yucca, cacao, fruit tree and pasture.



Mono-cropping of coca bush on slopes, Monzon 2003

Low density coca fields in Monzon, 2003

In Monzón valley, coca cultivation increased by 650 ha, or + 6% between 2003 and 2004. It was mainly due to an increase in the size of existing coca fields, in the areas of Monzón city, Shipaquillo, Maravillas, Caunarapa and Tazo alto, and to a minor extent to the establishment of new coca fields.

Coca fields have long been established in Monzón valley and most of them are over 10 years old. Typically, coca fields in Monzón valley are less productive than in other parts of Alto Huallaga. However, there were recent reports of farmers interspersing new coca plants among older coca plants to increase the density and thereby their coca leaf yield.

The economy of Monzón valley is almost exclusively dependent on coca cultivation for the cocaine market. Up-to-date data on the number of persons living in this valley does not exist. However local authorities usually mentioned about 35,000 inhabitants living in the valley, but this does not take into account the external labour recruited for harvesting of coca leaf and processing of coca paste. The coca farmers organizations of Monzón strongly opposed the efforts of the government to reduce coca cultivation, and the insecurity and violence brought by these organizations were constant in 2004. These tense conditions, that prevailed for the past three years, have prevented the local authorities and the personnel of alternative development projects from entering the valley and working with the 1,200 people registered as beneficiaries of Alternative Development projects in Monzón.

In 2004, there was no forced eradication of coca fields in Alto Huallaga. The only eradication reports came from the voluntary eradication programme promoted by DEVIDA with the support of CADA (Alternative Development Assistance Body). Forty-five hectares were so eradicated around Tingo Maria and another eighty ha around Tocache.

In the first two weeks of October 2004, the Monzón valley was also the scene of an anti-narcotics operation and DIRANDRO reported the seizure of two metric tons of cocaine paste and resulted in the destruction of 115 cocaine paste laboratories. These seizure and destructions attested that coca production in Monzon valley was oriented towards the processing of coca paste, coca base and cocaine hydrochloride.



Coca fields in Monzon, 2004



Coca fields in Monzon with partial lack of vegetative cover, 2004



Coca cultivation density in Apurimac  $\pm ne$ , 2004

Source: Government of Peru - National monitoring system supported by UNODC

The boundaries and names shown and the designations used on this map do not imply official endorsement or aceptance by the United Nations

# 2.1.1.2 Coca cultivation in Apurimac-Ene

The region is situated in the central part of the country extending over 12,000 sq km in the valleys of the rivers Apurimac and Ene, among the departments of Ayacucho, Cusco and Junín. The relief is uneven, and coca cultivation takes place at altitudes ranging between 550 and 2,000 meters above sea level.

Coca cultivation has long been established in Apurimac-Ene, predominantly on the steep slopes areas where the only other crops that can be grown are coffee and a few leguminous. To a lesser extent coca is also grown in areas of lower slopes, sharing the land with annual crops like maize, yucca, beans, sesame and permanent crops like cacao and fruit trees.

Apurimac-Ene is the second largest coca growing region of Peru, and with 14,700 ha in 2004, it represented 29% of the national total. The level of coca cultivation in 2004 remained fairly stable compared to 2003, and only a small increase of 370 ha, or 3%, was noted. New coca fields were reported in the localities of Boca Mantaro and Valle Esmeralda, situated near Canayre locality which is the most important centre of coca cultivation in the region. New cleared fields were also observed by the monitoring project in this area during an over-flight at low altitude in February 2005, an indication that farmers might plant coca bushes in the near future. According to local authorities, coca cultivation in this area would be linked to the presence of subversive groups.

Region	2001	2002	2003	2004	% change 2003 - 2004	% of 2004 total
Apurimac	12,600	13,283	13,777	13,382	-3%	91%
Ene	0	887	923	1,319	43%	9%
Rounded total	12,600	14,170	14,300	14,700	3%	100%

Table 5: Distribution of coca cultivation in Apurimac-Ene,2001 – 2004 (ha)



Figure 5. Distribution of coca cultivation in Apurimac-Ene,2001 – 2004 (ha)

The main centres of coca cultivation in Apurimac-Ene are situated around the localities of San Antonio, Monterrico, Palmapampa, Santa Rosa, Catarata, Alto Pichari, Sivia and Llochegua. The levels of coca cultivation did not change much in these areas between 2003 and 2004. The small level of increase of coca cultivation was probably due to the fact that all previously abandoned coca fields had already been rehabilitated in 2001 and 2002. In 2004, like in 2003, coca farmers have chosen not to risk investing in new crops in an environment of frequent political and social turmoil. In this context farmers prefer to increase the use of fertilizer and the plant density of existing coca fields. It is not uncommon to see coca fields with more than 100,000 plants per ha in Apurimac-Ene.

According to the population statistics of INEI, in 1994 there were 93,800 inhabitants (18,500 families) in Apurimac-Ene. Since then, the population has naturally increased, but it is also likely that it counts now with new migrants from the poorest areas of the Andean region who arrived in Apurimac-Ene, attracted by the demand for labour in the coca fields. A large majority of the population in Apurimac-Ene benefits directly or indirectly from coca cultivation.

In 2004, the social and political situation remained tense in Apurimac-Ene. There were numerous road blockades by farmers organizations protesting against possible eradication of coca fields and demanding the release of their jailed leaders. Eventually, there was no forced eradication of coca under the CORAH programme in Apurimac-Ene, and only 207 ha were voluntary eradicated with the cooperation of the local population under the programme of voluntary eradication supported by DEVIDA.

DIRANDRO conducted throughout 2004 operations aiming at the destructions of coca leaf maceration pits and clandestine laboratories of coca paste. One of the most important operation was conducted in November 2004. These destructions attested that coca leaves production in this region was oriented towards the processing of coca base and cocaine hydrochloride.

The social tensions surrounding the issue of coca cultivation were noticeable for the past two years and impeded the work of various organizations working in alternative development projects. Since 1995, UNODC has been implementing Alternative Development projects to improve coffee and palm trees production, benefiting about 1,100 persons.



Recently planted coca field - Sector Monterrico, Apurimac, August 2004



Recently harvested coca fields, sector M onterrico – Apurimac, August 2004



Coca fields, sector Monterrico – Apurimac, August 2004



Source: Government of Peru - National of monitoring system supported by UNODC

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

# 2.1.1.3 Coca cultivation in La Convencion y Lares

The region is situated in the province of La Convencion in the department of Cusco. The natural vegetation is made of subtropical forests. Due to intense deforestation, the primary forest is nowadays only found in the higher parts of the region. Coca is mostly cultivated between 800 and 2,000 meter above sea, in the valleys of the rivers Urubamba and Yanatile.

Historically, the region has been considered as the coca cultivation centre for the traditional use of coca leaves. In 1978, the state company ENACO registered 12,685 coca farmers for the cultivation of 10,670 ha of coca bush.

In 2004, coca cultivation reached 12,700 ha, representing 25% of the national total, which ranked the region third in terms of coca cultivation, behind Alto Huallaga and Apurimac. Compared to 2003 there was a slight increase of 3% in coca cultivation.

Region	2001	2002	2003	2004	% change 2003 – 2004	% of 2004 regional total
La Convención	8,455	6,086	5,476	5,339	-3%	42%
Lares	5,525	6,084	6,864	7,361	7%	58%
Total	13,980	12,170	12,340	12,700	3%	100%

 Table 6:
 Distribution of coca cultivation in La Convencion y Lares, 2001 – 2004 (ha)

Until the end of the nineties, coca cultivation was managed traditionally, with little use of fertilizers and coca field with low density of coca plants. However, in the past three years, old fields have been gradually rejuvenated and their coca plant density increased.





ENACO is present in La Convención y Lares, and purchases between 2,500 and 3,500 metric tons of coca leaf. However, an important part of the coca leaf production escapes the control of ENACO and enter the illicit market which offers better prices. In 2004, coca farmers requested ENACO to increase the quantity purchased and the prices for coca leaf. After a one-day strike that paralyzed the region in October, a governmental commission proposed to purchase 2,400 metric tons of coca leaves from the Yanatile valley at a prices of US\$ 1.7/kg, representing a budget of US\$ 4 million, instead of the average annual price in the region of US\$ 1.5/kg for the coca leaf of the first quality and US\$ 1.0/kg for coca leaf of the second quality. However, local authorities from La Convención requested the purchase of 5,000 metric tons and since then the situation has remained tense in the region.

Coca cultivation density in San Gaban and Inambari - Tambopata, 2004



Source: Government of Peru - National monitoring system supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

# 2.1.1.4 Coca cultivation in Inambari-Tambopata

The rivers Inambari and Tambopata constitute the two main valleys for coca cultivation in the province of Macusani in Puno department. According to the National System of Land Classification, only 1% of the land would be suitable for agricultural activities while 99% of the land is on steep slopes considered protected areas because of their vulnerability to erosion. Coca cultivation mainly takes place on these steep slopes, between 800 and 1,800 meter above sea. ENACO data from 1988 registered 1,778 coca farmers for a declared area of coca cultivation of 783 ha.

In 2004, coca cultivation was estimated at 2,000 ha representing 4% of the national total. Compared to 2003, it is the only region where a decrease in coca cultivation was noted with 260 ha (or - 12%). Fields reports indicated that in 2004 a lot of farmers carried out the traditional rejuvenation of the coca fields, by cutting the coca bush and leaving only a trunk of about 10 cm. It takes about 12 months to harvest to following coca crop. This practice might explain that a fraction of the coca fields could not be detected on the satellite images and contributed to the decrease in coca cultivation in the region between 2003 and 2004.

Region	2001	2002	2003	2004	% Change 2003 - 2004	% of 2004 regional total
Inambari	1,903	1,761	1,441	1,913	33%	96%
Tambopata	617	669	819	87	-89%	4%
Rounded total	2,520	2,430	2,260	2,000	-12%	100%

#### Table 7: Distribution of coca cultivation in Inambari-Tambopata, 2001 – 2004 (ha)

Most the cultivation is found in Inambari valley. In this valley, coca fields can also be found interspersed with other crops. In general in the region, farmers do not depend only on coca cultivation, but also possess fields where they grow coffee and other crops. Since 2000, UNODC implemented alternative development projects to improve coffee production. Its presence contributed to the decrease of coca cultivation in the region.



Coca bush interspersed with forest trees, Inambari, February 2005



Coca field in Inambari, February 2005

## 2.1.1.5 Coca cultivation in San Gaban

San Gaban region is presented on the same map as Inambari-Tambopata region. The valley of the San Gaban river is part of the larger watershed of the Inambari river. It is situated in the north-western part of the department of Puno bordering Bolivia. The relief is uneven and covered by high altitude tropical forest. Coca cultivation mostly takes place between 400 and 1,200 meter above sea level, on the high slope areas situated in the middle and low parts of the San Gaban valley, up to its connection with the Inambari river. The area includes by the localities of Juliaca, Puerto Maldonado and Iñapari at the border with Brazil.

In 2003, the national monitoring system supported by UNODC did a first estimate of coca cultivation in San Gaban and interpreted 465 ha on a satellite images dated May 2003. On 3<sup>rd</sup> September 2004, a second satellite images was acquired and revealed the cultivation of 2,700 ha of coca bush, representing 5% of the national total. The productive coca fields detected in 2004 were probably planted in 2003, but could not be detected earlier because it takes about one year for the fields to develop into productive coca fields and be noticeable on the satellite images.

The strong increase in coca cultivation in San Gaban can be observed visually on the same portions of two SPOT images, one taken in 2003 and the other in 2004. New coca fields were planted at the expense of forested areas.



SPOT5 – San Gaban June 2003 SPOT5 – San Gaban September 2004 Coca fields in pink on the false color image, forests appeared in green

The Government of Peru (CORAH) started eradicating coca fields in San Gaban on 28 September 2004, but faced strong opposition from the local population which threatened to take the local hydroelectric power station. At the end of October, representatives of the Central Government and of the local organization of coca farmers agreed that eradication would continue, providing it involved the participation of the farmers themselves. When eradication resumed, the local authorities and a group of coca farmers continued to demonstrate hostility against the central government forces in charge of the eradication activities.

As of December, the government reported the eradication of 1,506 ha of coca cultivation in San Gaban for the year 2004. The results of the coca survey corresponded to the situation as of September 2004 when the satellite image was acquired. The result of the eradication campaign will be noticeable in the images to be acquired in 2005 and reflected in next year's estimate.



SPOT5 – San Gaban June 2003 SPOT5 – San Gaban September 2004 Coca fields in pink on the false color image

The reports of the destruction of ten maceration pits and the seizure of chemicals and coca paste in San Gaban by DIRANDRO were evidences that most of the coca cultivation was intended for processing into cocaine.

At the end of the nineties, the population of San Gaban was made of handful of migrants from Puno, Arequipa and Cusco, reaching only 1,091 inhabitants in 2000 according to the Pooling Office. They were moved by poverty out of their places of origin and started in San Gaban to make use of the forest and developed some small scale agricultural and mining activities. It is in this context that they started to grow coca, mostly for their own local consumption.

The increase in prices for coca leaves from US\$ 2/kg in 2000 to an average of US\$ 3.8/kg in 2004, triggered the increase of coca cultivation. The region is also close to Bolivia where coca leaf prices fetched an average of US\$ 4.8/kg in 2004, making the export of coca leaves a lucrative business. The cross-border business of coca leaves was also evidenced by the increase in seizure of Peruvian coca leaves at the Bolivian border post of Desaguadero, close to Puno department. Coca cultivation recently attracted new migrants, and according to the local authorities, the population of San Gaban quadrupled in 2004.



Recently planted coca fields, San Gaban, 2004





Source: Government of Peru - National monitoring system supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or aceptance by the United Nations

# 2.1.1.6 Coca cultivation in Aguaytia

Aguaytia is a valley situated in Aguaytia province in the department of Ucayali. The region is made flat alluvial land and hills where coca cultivation takes place between 300 and 600 meters above sea level.

Table 8:	Coca cultivation in Aguaytia region(ha	I)
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Region	2001	2002	2003	2004	Change 2003 - 2004	% of 2004 total
Aguaytía	1,051	1,070	510	500	-10	1%



Figure 7. Coca cultivation in Aguaytia region

In 2004, coca cultivation was estimated at 540 ha, a rather stable situation compared to last year estimate of 510 ha (+ 6.5%). Coca cultivation in Aguaytia represented 1% of the country total in 2004.

Most of the coca cultivation was concentrated around the locality of Huipoca, and small patches of coca cultivation could also be found along the Shambillo river. Coca fields were relatively less dense and productive then in other regions. It could be found mixed with other crops and under trees canopy. In these cases, the yield was probably even lower then on pure coca fields. There were little reports on the use of agrochemicals in the coca fields in this region.

Although coca cultivation from Aguaytia was destined for the cocaine market, coca cultivation did not represent any longer the basis of the agricultural economy of the region. Most of the crops were banana, pineapple, cotton, and recently palm oil plantation supported by UNODC. The palm oil plantation of 2000 ha benefited to 400 persons, most of them former coca growers.

In Aguaytia, a few associations of coca farmers were created in the early nineties. Some of them were still active and participated in the protests organized by the organizations of coca farmers of Alto Huallaga in 2004.

There were a few operations of voluntary eradication conducted in the area of Campo Verde. However, farmers with high yielding coca fields were often reluctant to participate to this programme.

## 2.1.1.7 Coca cultivation in Palcazu – Pichis - Pachitea

The valleys of the rivers Palcazu, Pichis and Pachitea are situated in the province of Oxapampa in the department of Pasco, and the region is often referred to as 'Selva Central', the country central forest. The landscape is predominantly hilly, alternating with flat areas. Coca cultivation is found between 300 and 500 meters above sea level.

In 2004, coca cultivation was estimated at about 300 ha, representing only 1% of the national total. Compared to 2003, there was an increase of 50 ha of coca cultivation.

Region	2001	2002	2003	2004	Change 2003 - 2004	% of 2004 total
Palcazu	100	150	102	161	58%	54%
Pichis	100	98	73	96	32%	32%
Pachitea	150	102	75	43	-43%	14%
Rounded total	350	350	250	300	20%	100%

Table 9: Distribution of coca cultivation in Palcazu-Pichis-Pachitea, 2001 – 2004 (ha)

The presence of coca cultivation in this region has been attested since 1986. In the early 1990s, coca cultivation in this region reached up to 12,000 ha for a production of coca leaves oriented towards cocaine production. The prices fall of the mid-nineties caused the end of coca cultivation in the region. In 2004, coca cultivation often took place below tree canopy to avoid detection, which resulted in very low coca leaf yield.

In 2000, UNODC launched an alternative development project mainly oriented towards the genetic improvement of cattle, and the training of native communities in the extraction of latex from Hevea trees.

The eradication efforts in the region also included the destruction of abandoned coca fields to avoid their rehabilitation. For the farmers, the rehabilitation of former coca fields is much quicker and cheaper than the establishment of new fields.

#### 2.1.1.8 Coca cultivation in Marañon - Putumayo

There were marginal levels of coca cultivation in the higher areas of the Marañon valley, situated in the northern part of the Andean region, as well as in the Putumayo region close to the border with Colombia in the north-eastern part of the country. Coca cultivation was estimated at only 350 ha for these two regions.

In Marañon, in 1988, ENACO registered 900 coca farmers in the areas of Huayobamba and Balzas, for a total of about 300 ha. In 2004, coca cultivation was restricted to a few alluvial cones and was estimated at about 250 ha.

The Putumayo region is situated along the Putumayo river that makes the border with Colombia. Although close to the important coca cultivation of Putumayo on the Colombian side of the river, coca cultivation on the Peruvian side was considered very low in 2004. Over-flights were conducted over the region, but did not detect important level of coca cultivation, estimated at about 100 ha. No satellite image was acquired over Putumayo region.

## 2.1.2 PRODUCTION COCA LEAF AND DERIVATIVES

The total sun-dried coca leaf production in 2004 for Peru was estimated to range between 96,000 and 123,000 metric tons, with an average estimation of 110,000 metric tons, equivalent to a production of oven-dried<sup>3</sup> coca leaf of about 76,500 metric tons (+/- 12%). Based on a conversion rate of 375 kg<sup>4</sup> of oven-dried coca leaf for 1 kg of cocaine, the potential production of cocaine was estimated to range between 160 and 210 metric tons, with an average rounded estimation of 190 metric tons. The detailed calculation for the estimation of cocaine production is presented in a table on the next page.

The UNODC coca leaf yield study conducted in 2004 revealed higher coca yield than measured during the first UNODC study carried out in 2001. Although the data sets cannot be directly compared because they rely on different data collection methodology, the increase in coca leaf yield measured between 2001 and 2004 corroborated field reports that farmers indeed had improved their field management practices in the past few years.

	1004	1005	1000	4007	1000	4000	2000	2004	20
Table 10:	Peru p	otential c	cocaine p	oroductio	n 1994 -	-2004 (1	n metric	tons)	

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Cocaine (mt)	435	460	435	325	240	175	141	150	165	155	190



Figure 8. Peru potential cocaine production 1994 – 2004 (in metric tons)

<sup>&</sup>lt;sup>3</sup> Assuming an average 57% moisture content of sun-dried leaf and 70% moisture content of oven-dried leaf

<sup>&</sup>lt;sup>4</sup> DEA Operation Breakthrough 2003 -2004 in Peru



Source: Government of Peru - National of monitoring system supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations
Region	Cultivation	Annual sun-dried leaf	Production sun-dried leaf	Lower boundary sun-dried coca leaf production	Upper boundary sun-dried coca leaf production
	(na)	(kg/na)	(tons)	(tons)	(tons)
Apurimac – Ene	14,700	3,627*	53,317	45,144	61,505
Alto Huallaga	5,600	2,988*	16,733	15,417	18,049
Alto Huallaga (Monzon)	11,300	1,197	13,526	11,866	15,189
La Convencion - Lares	12,700	1,457*	18,507	17,127	19,888
San Gaban	2,700	1,290	3,483	3,055	3,911
Inambari - Tambopata	2,000	1,290	2,580	2,263	2,897
Aguaytia	500	1,376	688	604	773
Marañon, Putumayo	500	860	430	377	483
Palcazu - Pichis - Pachitea	300	1,433	430	377	483
Rounded total and average	50,300	2,200	109,700	96,200	123,200
Production of coca leaf for traditional, commercial and industrial purposes <sup>5</sup>			9,000	9,000	9,000
Potential coca leaf production available for cocaine production			100,700	87,200	114,200
Equivalent oven-dried			70,300	60,837	79,674
Equivalent potential cocaine production*			187	162	212
Rounded potentical cocaine production			190	160	210

#### Table 11: Calculation for potential cocaine production in Peru, 2004

2004 coca leaf yield estimate

Between June 2003 and January 2005, UNODC conducted a coca leaf field study in 55 plots of 13 fields in three regions of Peru: Alto Huallaga (except Monzón), Apurimac-Ene, La Convención y Lares. The analysis of the data revealed highest annual sun-dried coca leaf yield in Apurimac-Ene (3,627 kg/ha), than in Alto Huallaga (except Monzón) (2,988 kg/ha) and La Convención y Lares (1,457 kg/ha). The study also showed that fresh coca leaves lost on average 57% of their weight during the sun-drying process.

The regional coca leaf averages obtained in 2004 were used in the calculation of the potential coca leaf production in 2004 for these regions. For Alto Huallaga, the social tensions prevailing in Monzon valley since 2003, prevented the implementation of the coca yield survey in this valley. As the coca leaf yield in Monzon valley was considered different than in other parts of Alto Huallaga, the average coca leaf yield obtained elsewhere in Alto Huallaga was not applied. For Monzon valley, the coca leaf yield applied since 2001 continued to be used, as well as for the other regions that were not included in the 2004 yield survey.

According to a study published in November 2004 by the National Institute of Statistics and Computers Science (INEI) and financed by DEVIDA, the total annual demand for coca leaves for traditional, commercial or industrial uses amounted to 9,000 metric tons. This amount was deduced of the potential coca leaf production before estimating the cocaine production.

To estimate cocaine production, the latest data available on cocaine yield were from the US "Operation breakthrough' conducted in 2003 and 2004 in Peru. This study indicated that 375 kg of oven-dried coca leaf were needed to produce one kg of cocaine hydrochloride. Based on this finding and on an average loss of 57% of weight for sun-dried leaves and further assuming a loss of 70% of weight between fresh leave and oven-dried leaves, the total potential cocaine hydrochloride production in Peru was estimated at 190 metric tons. Previous studies by UNODC and the US government, indicated that about 325 kg of oven-dried coca leaf were necessary to

<sup>&</sup>lt;sup>5</sup> "Encuesta Nacional sobre consumo tradicional de hoja de coca en los hogares", INEI – DEVIDA, November 2004

necessary to produce one kg of cocaine. This was the rate used in 2003, which explained that although between 2003 and 2004 there was an increase of 50% in the estimation of the sun-dried coca leaves while the increase in cocaine production was only of 23%.

The estimation of the potential pure cocaine hydrochloride production was considered less precise than the estimation of coca cultivation. There are only few data available to quantify all the steps from coca leaves to cocaine and so far UNODC has limited its investigation to the assessment of coca leaf yield in a few regions, whose findings are presented here below. UNODC research on coca leaf and cocaine yield should be expanded in the future.

The results by harvest of the coca leaf study conducted by UNODC between June 2003 and January 2005, are presented below.

Region	Harvest	Fresh leaf mean yield	Sun-dried mean yield	Lower boundary (95%) for sun-dried mean yield	Upper boundary (95%) for sun-dried mean yield
Alto Huallaga	1	1,454	596	435	680
(except Monzón)	2	1,447	594	437	698
	3	1,336	553	409	653
	4	1,682	687	564	764
	5	1,362	559	400	667
Annual average		7,280	2,988	2,753	3,223
Apurimac	1	1,937	819	573	976
	2	1,998	819	568	997
	3	1,899	873	712	974
	4	2,677	1,116	897	1,263
Annual average		8,511	3,627	3,071	4,184
La Convencion	1	1,102	473	354	578
	2	1,150	522	449	590
	3	1,000	462	332	515
Annual average		3,252	1,457	1,349	1,566

Table 12: Fresh and sun-dried coca leaf yield in 2004, by harvest and by year (kg/ha)

Figure 9. Sun-dried annual average coca leaf yield, with upper and lower boundaries, in Apurimac-Ene, Alto Huallaga and La Convención y Lares in 2004



The analysis of the confidence intervals indicated that yields from different fields could varied considerably in Apurimac (+/- 15%), but were much more stable in La Convención y Lares (+/-5%).

The analysis of the change in coca leaf yield between 2001 and 2004, also revealed that yield increased more in Alto-Huallaga and La Convencion y Lares, but remained rather stable in Apurimac-Ene where coca leaf yield was already the highest in 2001.

Region	2001	2004		
Apurimac	3,300	3,627		
Alto Huallaga (except Monzon)	1,197	2,988		
La Convencion	600	1,457		

Table 13: Change in sun-dried equivalent coca leaf yield between 2001 and 2004

Figure 10. Change in sun-dried equivalent coca leaf yield between 2001 and 2004



The lower yield obtained from La Convención y Lares might be attributed to the fact that fields were older in this region than in Apurimac and Alto Huallaga. The survey showed that coca fields were on average 17 years old in La Convención y Lares, which has been a long established coca growing area. Coca fields were the youngest in Alto Huallaga, with an average of 10 years old field.

Table AA.	A	C - 1 - 1	D
Table 14:	Age of coca	tiela per region,	Peru 2004

Region	Field age	Upper boundary (95%)	Lower boundary (95%)	
Apurimac	11.5	14.7	8.2	
Alto Huallaga (except Monzon)	10.6	10.9	10.3	
La Convencion	17.0	24.9	9.1	

Figure 11.	Age of	coca	fields per	region,	Peru 2004
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#### Peru Coca Survey for 2004

When analysed by trimester, the data showed that the harvests in Apurimac-Ene and Alto Huallaga were on average better between October and December. By contrast, none of the sampled coca fields were harvested in La Convención y Lares during that last trimester. As coca leaf yields were higher in Apurimac-Ene and Alto Huallaga than in La Convención y Lares in the first three trimesters, the absence of harvest during the last trimester in La Convención y Lares obviously increased the average weight for harvests for that period. Nevertheless, coca leaf yields were highest during the last trimester in both Apurimac-Ene and Alto Huallaga.

Region	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
Alto Huallaga	596	594	553	614
Apurimac – Ene	819	819	873	1,116
La Convencion y Lares	473	522	462	
Average	670	681	680	846

Table 15: Sun-dried coca leaf yield by trimester and region, Peru 2004 (kg/ha)





Alto Huallaga Apurimac La Convencion

The comparison of the weight of the fresh and sun-dried coca leaf revealed that the humidity lost during the drying process ranged between 50% and 60% of the fresh weight, with an average of 57%. The average lost between weight fresh and sun-dried leaves was 59% in Alto Huallaga, 57% in Apurimac and 55% in La Convención y Lares. There was a consistent slight diminution of this factor from July to September.

#### 2.2 PRICES OF COCA LEAF, COCA BASE AND COCAINE

There are two distinct markets for coca leaves in Peru: one market regulated by ENACO, the national state company which has the monopoly for the trading of coca leaves for traditional uses and for export for flavouring of some beverages, and the second which is unregulated and mainly supply coca leaves for processing into cocaine, but also includes trading of coca leave for traditional uses.

In 2004, prices for coca leaves from ENACO averaged SOL 5.1 /kg (US\$ 1.4/kg). Prices were stable throughout the year and throughout the country, except in Apurimac where prices below the national annual average were offered (SOL 4.3/kg or US\$ 1.2/kg). In 2004, ENACO reported the

trade of 2,600 mt of coca leaves, representing about 2% of the total potential production of coca leaves in the country of 110,000 metric tons.

Region	Aguaytia	Apurimac	Inambari	Alto Huallaga	Selva central	La Convención - Lares	Average	Average (US\$/kg)
January	5.4	4.3		5.2			5.0	1.4
February	5.2	4.3		5.2			4.9	1.4
March	5.2	3.9	6.3	5.2			5.2	1.4
April	5.2	4.3	8.3	5.2			5.8	1.6
May	5.2		8.3	5.2			6.2	1.7
June	5.2	4.3	4.8	5.2			4.9	1.4
July	5.2			5.2			5.2	1.5
August	5.2		3.9	5.2			4.8	1.4
September	5.2	4.3	3.9	5.2			4.7	1.3
October	5.2	4.3	3.9	5.2			4.7	1.4
November	5.2	4.3	3.9	5.2			4.7	1.4
December	5.2	4.3	3.9	5.2			4.7	1.4
Average SOL/kg	5.2	4.3	5.2	5.2	n.c.	5.2	5.1	
Average US\$/kg	1.5	1.2	1.5	1.5	n.c.	1.5		1.4

Table 16: Monthly ENACO coca leaf prices, Peru , 2004 (in SOL/kg)

Source: PDA and national monitoring system supported by UNODC n.c.: not collected

The bulk of coca leaf production (98%) was traded outside the market regulated by ENACO and at much higher prices that averaged SOL 9.8/kg of US\$ 2.8/kg in 2004.

	Alto Huallaga		Apurimac	Inambari	Aguaytia	Selva Central	La Conven ción- Lares	Simple average		
	Monzon	South	North						SOL/kg	US\$/kg
January	12.8	11.7	5.6	7.0		7.8			9.0	2.5
February	10.1	12.6	8.5	7.8		7.8			9.4	2.6
March	10.6	12.2	9.1	6.5	9.6	7.8			9.3	2.6
April	11.4	10.7	7.0	6.5	7.4	7.8			8.5	2.4
Мау	12.5	12.2	7.4	7.4	8.3	7.8			9.3	2.6
June	12.8	11.3	6.1	6.5	9.6	7.0			8.9	2.5
July	12.4	12.2	7.4			8.7			10.2	2.9
August	12.2	13.9	8.7		12.2	8.7			11.1	3.2
September	12.7	13.0	8.7	10.4	10.4	10.1			10.9	3.1
October	13.3	13.5	9.0	11.3	11.2	7.8			11.0	3.2
November	16.8	15.3	8.4	10.4	10.3	7.8			11.5	3.5
December	14.0	8.7	6.3	7.8	10.3	7.8	7.0		8.8	2.7
Average SOL/kg	12.6	12.3	7.7	8.2	9.9	8.1	7.0	n.c.	9.8	
Average US\$/kg	3.6	3.5	2.2	2.3	2.8	2.3	2.0	n.c.		2.8

 Table 17:
 Monthly coca leaf prices in Peru, 2004 (SOL/kg)

Source: PDA and national monitoring system supported by UNODC n.c. : not collected

In every region, prices for coca leaves on the unregulated market were higher than prices offered by ENACO. The difference was particular important in Southern Alto Huallaga (Monzon valley and around the city of Tingo María), with prices on the unregulated market more than double the prices of coca leaves offered by ENACO. It should also be mentioned that ENACO did not purchase coca leaves from Monzon valley.





□ Not regulated by ENACO □ Regulated by ENACO

Prices for coca leaves on the unregulated market were highest in the southern part of Alto Huallaga, ranging from an average of US\$ 3.5/kg around the city of Tingo Maria and US\$ 3.6/kg in Monzon valley. These prices were on average above 25% higher than the national average of US\$ 2.8/kg. There were unconfirmed reports that coca leaves in Southern Alto Huallaga, and in particular in Monzon, would be of higher alkaloid content than elsewhere in the country.

The annual average price of US\$ 2.8/kg for coca leaves represented an increase of 33% compared to the annual average price of US\$ 2.2/kg in 2003. On the long term, coca leaves prices have tended to increase since their lowest level of US\$ 0.6/kg in 1996 when there was little demand for coca leaves. The 2004 average annual price was the highest recorded since 1990. The detailed monthly prices for coca leaves since 1990 are presented in a table in annex.



Figure 14. Monthly farm-gate prices of coca leaf in Peru 1990 - 2003 (US\$/kg)

Monthly prices — Annual trend

In 2004, the gross potential farm-gate value of the sun-dried coca leaf production amounted to US\$ 304 million, estimated from the sale of 107.4 metric tons at US\$ 2.8/kg on the unregulated market and 2.6 metric tons at US\$ 1.4/kg on the market regulated by ENACO. This represented 0.44% of the 2004 GDP estimated at US\$ 68.5 billions.

Farm-gate value for 2004 was calculated based on coca leaf yield data obtained by UNODC in 2004. In 2003, farm-gate value for 2003 of US\$ 112 million was estimated using coca leaf yield dating 2001. The total farm-gate value for 2001 and 2004 were therefore not directly comparable.

In 2004, the price for coca base ('pasta bruta lavada') was estimated at US\$ 640/kg, an increase of 21% compared to US\$ 530/kg in 2003.

	1999	2000	2001	2002	2003	2004
January		450	546	547	527	574
February		456	505	621	590	635
March		444	519	552	519	671
April		460	578	549	562	583
Мау		473	556	553	518	669
June		506	586	543	507	609
July		525	580	595	527	519
August	528	515	599	647	520	700
September	598	560	599	635	567	695
October	634	586	588	587	570	689
November	565	575	518	606	560	728
December	490	522	532	590	448	591
Annual Average US\$/kg (rounded)	560	510	560	590	530	640

Table 18: Monthly prices of coca base in Peru 1999 - 2004 (US\$/kg)

Source: national monitoring system supported by UNODC

Like for the prices of coca leaves, prices of coca base was higher in Alto Huallaga than elsewhere in the country.

	Alto Huallaga		Apur- imac	Inambari	Aguaytia	Selva Central	La Convenc ión- Lares	Average	
	Monz on	South	North						
January		717	493	520		500			570
February		723	630	520		500			640
March		787	660	530		500			670
April		683	527	530		500			580
May		780	607	520					670
June		733	513	530		600			610
July		445	593						520
August		733	700	600					700
September		727	663						700
October		713	673	700		650			690
November		833	657	700		650			730
December		647	500	700					590
Average	n.c.	710	601	585	n.c.	557	n.c.	n.c.	640

Table 19: Monthly prices of coca base by region in Peru 2004 (US\$/kg)

Source: PDA, national monitoring system supported by UNODC (n.c. = not collected)

Prices for coca base in 2004 were the highest since 1999.

Figure 15. Monthly coca base prices in Peru, August 1999-December 2004 (US\$/kg)



The average annual price of cocaine hydrochloride was estimated at US\$890/kg. Cocaine prices were not recorded systematically in the past. It was thus not possible to define a trend in cocaine prices in Peru.

	Alto Huallaga		Apurimac	Inam bari	Aguaytia	Selva Central	La Conven ción- Lares	Average	
	Monzon	South	North						
January		917	690			700			789
February		1,027	807			800			900
March		967	860			800			897
April		900	727			800			811
May		983	817						900
June		867	717			1,000			821
July		940	793						867
August		967	900						933
September		1,033	923						978
October		1,000	950			1,000			979
November		1,083	957			1,000			1,017
December		847	700						773
Average (ro	unded)	960	820	n.c.	n.c.	870	n.c.	n.c.	890

Table 20: Monthly prices of cocaine HCl by region in Peru 2004 (US\$/kg)

Source: national monitoring system supported by UNODC, n.c. = not collected

In 2004, prices of cocaine were rather similar throughout the country, and on average they were 39% higher than prices of coca base.





<sup>■</sup> cocaine base ■ cocaine HCL

The main coastal cities (Ica, Trujillo, Chiclayo and the outskirt of Lima) continued to be the main centres for the production of cocaine hydrochloride. In these cities, the gross prices for cocaine HCl varied between 1,300 and 1,600 US\$/kg, depending on the quality. The street prices for the consumer were around US\$ 6/gr (US\$ 6,000 /kg) for high-quality cocaine and between US\$ 3 to 4/gr (US\$3,000 to US\$4,000/kg) for lower grade cocaine.

#### 2.3 COCA CULTIVATION AND RELATED ISSUES

#### 2.3.1 COCA CULTIVATION AND POVERTY

The latest comprehensive study on poverty in Peru was conducted in 2000 by FONCODES, the National Funds for Compensation and Social Development. Even though there study years were different, the analysis of district poverty indicators of 2000 with level of coca cultivation in 2004 clearly showed that districts where coca cultivation was found were poorer than other districts.

The 2000 poverty indicator of FONCODES was a unique indicator that combines seven factors at the district level: chronic malnutrition rate, percentage of students population exceeding the existing school capacity, percentage of population exceeding the existing capacity of the postal service, percentage of the population without access to water system, percentage of the population without connection to the water drainage system, road access and percentage of the population without access to electricity. The district relative poverty indicators measured the extent of the social gap between each district compared to the less poor district of the country. They ranged from 1 for a rich district to 50 for an extremely poor district.

Coca cultivation in 2004 was found in 47 districts, thereby affecting directly or indirectly the lives of more than 650,000 inhabitants, or about 2.6% of the total Peruvian population of 25 million. On average, districts where coca cultivation was found were qualified as 'very poor', with relative poverty indicators ranging from 30 to 40. The only district with coca cultivation that classified as 'normal' was the district of Huanuco in the province of Leoncio Prado. The other 46 coca cultivating district were classified as poor, very poor or extremely poor. By contrast, districts without coca cultivation were on average defined as 'poor' with average relative poverty ranging between 20 and 30.





Only 15% of the population living in districts where there coca cultivation had access to improved sanitation, whereas this percentage went up to 28% in the district without coca cultivation. The proportion of population with access to safe drinking water was lower in coca cultivation districts than in the non-coca cultivation districts. Only 40% of the population of coca cultivation districts had access to safe drinking water, whereas the percentage in the non-coca cultivation districts was 62%. Only 25% of the population living in coca cultivation districts had access to electricity.

Figure 18. Percentage of population without access to safe drinking water, sanitation and electricity in coca cultivating and non-coca cultivating districts, Peru.



Most of the districts with coca cultivation have higher proportions of population living below the minimum levels of nutritional energy consumption. At the national level, 31% of the population lived with an imbalance between body needs and the intake of nutrients, whereas the average in the district with coca cultivation was 39%.

Of the 150,000 students living in the 47 coca cultivating districts, a higher percentage exceeded the existing school capacity than in the student population of non coca cultivating districts. There is therefore a real risk that off school children are employed in the labour intensive coca cultivation.





On average, the districts with coca cultivation were further away from the closest provincial capital than the non-coca cultivating districts. 76 km was the average distance between coca districts and the provincial capital, whereas 53 km was the average distance between non coca cultivating district and the provincial capital.

#### 2.3.2 COCA CULTIVATION AND LAND USE

The three main coca growing regions of Alto Huallaga, Apurimac-Ene and La Convención y Lares, coca cultivation spread of 19,400 sq km, of which coca cultivation occupies only 2%. These regions are characterised by steep slopes and poor soil. According to the national land use classification system, 86% of the total area of these three regions is made of land that do no meet the ecological conditions for agriculture and should be protected or devoted to forestry activities. However in 2004, 85% of the coca cultivation in these three regions were found on such type of land. In particular, in 2004, 24% of the coca was cultivated on protected areas, meaning areas that did no meet the minimum ecological requirement for agriculture and which hydrology and forests should be protected. The definition of protected areas includes national parks and biosphere reserves.

Table 21: Potential land use and coca cultivation in Alto Huallaga, Apurimac-Ene and La<br/>Convención y Lares (ha)

Potential land use	Total area (ha)	% of total area	Coca cultivation in 2004 (ha)	% of coca cultivation in 2004 (ha)	% of area occupy by coca cultivation in 2004
Annual crop	4,573	1%	310	7%	1%
Annual and permanent crops	72,067	4%	2,202	3%	5%
Annual, permanent crops and pasture	172,223	9%	1,968	1%	4%
Permanent crop and forestry	27,679	1%	1,820	7%	4%
Permanent crop and pasture	4,611	0%	428	9%	1%
Permanent crop, pasture and forestry	11,721	1%	1,705	15%	4%
Forestry	169,930	9%	1,689	1%	4%
Protected areas	660,663	34%	10,678	2%	24%
Protected areas and forestry	816,037	42%	23,501	3%	53%
Total	1,939,504	100%	44,301	2%	100%

Figure 20. Distribution of coca cultivation in 2004 over land uses for Alto Huallaga, Apurimac-Ene and La Convencion y Lares





Source: Government of Peru - National of monitoring system supported by UNODC

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations



Potential land use and coca cultivation in Apurimac, 2004

Source: Government of Peru - National monitoring system supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or aceptance by the United Nations

# Table 22: Potential land use and coca cultivation in Alto Huallaga, Apurimac-Ene and La<br/>Convención y Lares

#### Alto Huallaga

Land use	Total	% of total land	2003	2004	% of totalcoca 2004	% occupy by coca 2004
Annual crop	4,573	0.4%	209	310	2%	7%
Annual and permanent crop	56,851	5%	1,179	1,883	11%	3%
Annual, permanent crop and pasture	172,223	15%	976	1362	8%	1%
Permanent crop, pasture and forestry	11,721	1%	1,337	1,705	10%	15%
Forestry	169,930	15%	980	1689	10%	1%
Protected areas	222,611	20%	110	136	1%	0%
Protected areas and forestry	498,253	44%	8,855	9,863	58%	2%
Total	1,136,162	100%	13,646	16,948	100%	1%

#### Apurimac

Land use	Total	% of total land	2003	2004	% of totalcoca 2004	% occupy by coca 2004
	(ha)		(ha)	(ha)	(ha)	
Annual and permanent crop	9,743	2.9%	523	606	4%	6%
Permanent crop and pasture	4,611	1%	415	428	3%	9%
Protected areas and forestry	317,784	96%	13361	13638	93%	4%
Total	332,138	100%	14,299	14,672	100%	4%

#### La convención y Lares

Land use	Total	% of total land	2003	20004	% of totalcoca 2004	% occupy by coca 2004
	(ha)		(ha)	(ha)	(ha)	
Annual and permanent crop	5,473	1%	249	319	3%	6%
Permanent crop and forestry	27,679	6%	1901	1820	14%	7%
Protected areas	438,052	93%	10187	10542	83%	2%
Total	471,204	100%	12,337	12,681	100%	3%

In Alto Huallaga, the increase in coca cultivation of 3,300 ha between 2003 and 2004 was mainly on land use that should rather be protected or devoted to forestry activities. The analysis of the distribution of the change in coca cultivation between 2003 and 2004 showed that 53% of the increase took place in protected and forest areas which are vulnerable areas where other land uses would be more appropriate, and only 21% on land dedicated to annual or permanent crops and 12% on land dedicated to for crops and pasture.





Table 23: Distribution of the increase in coca cultivation between 2003 and 2004 in Alto Huallaga

Potential land use	ha	in % of total
Protected areas and forestry	1,034	32%
Forestry	709	21%
Annual and permanent crop	704	21%
Annual, permanent crop and pasture	386	12%
Permanent crop, pasture and forestry	368	11%
Annual crop	101	3%
Total	3,302	

With the aerial photography acquired before 2000, the monitoring project was able to update the land use complete the national land use system map for the Monzon region, thereby completing the land use map of Alto Huallaga. These land use maps, can be a useful tool for agricultural development policy and can be made available on request.



Source: Government of Peru - National monitoring system supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations



Soils with capacity for cocoa tree cultivation in Monzon

Soils with capacity for paddy rice cultivation in Monzon



Source: Government of Peru - National monitoring system supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or aceptance by the United Nations

Map of land use capacity of Monzon valley

The UNODC monitoring project in Peru also achieved in September 2004 a study of the agricultural soil capacity of the Monzon valley. It was the first study of this kind implemented in a coca growing areas and was made despite political and social tensions in Monzon valley. The main objective of this study, financed by DEVIDA, was to provide the farmers organizations of the valley with a tool to facilitate the implementation and development of assistance projects to improve in a sustainable way the management of land use, including of natural resources.

The study covered an area of 262,435 ha, combining information from maps of potential land use, ecology and climatology, geology and geomorphology, forest cover, hydrology and potential for irrigation. All this information was combined into a GIS database and then processed to produce maps of best soil capacity for irrigation, rice, cocoa tree, coffee, citrus, pasture, forestry and protected forests. Examples of these maps for paddy rice and cocoa trees cultivation are presented on the opposite page. They shows the concentration of agricultural land at the bottom of Monzon valley, and the rather narrow potential for agricultural development.

The database was made available to the parties concerned to produce maps according to the needs. The results in terms of land use are synthesized in the following table.

Soil capacity	ha
Irrigation	1,155
Rice	3,700
Сосоа	3,900
Coffee	15,000
Citrus	15,000
Pasture	15,000
Forestry	14,800
Protected forest	134,800

 Table 24:
 Land use capacity in the Monzon valley

## Alternative development projects and coca cultivation, 2004



Source: Government of Peru - National monitoring system supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

#### 2.3.3 COCA CULTIVATION AND ALTERNATIVE DEVELOPMENT PROJECTS

In Peru, alternative development projects started in 1986. Between the year 1992, when coca cultivation peaked at 129,000 ha, and the year 2004, coca cultivation decreased by 61%. This remarkable decrease was attributed to a combination of eradication efforts, air control to prevent the transport of coca paste towards Colombia and implementation of alternative development projects.

Alternative development showed remarkable results in Aguatya and Bajo Huallaga. In the 1990s, a large proportion of the total coca cultivation in the country was grown in these two regions. Coca cultivation was reported to reach up to 16,000 ha in Aguatya and 12,000 ha in Bajo Huallaga. In 2004, coca cultivation had virtually disappeared from Bajo Huallaga and Aguatya.

As demonstrated in the case of Aguatya and Lower Huallaga, Alternative Development is a long term investment and its impact is not necessarily appreciated by the evolution of coca cultivation within short period of time. The social context and overall agricultural development stages also play a role, like in the case of Monzon valley where violence prevented the United Nations to implement development activities, or Apurimac-Ene where the fall in coffee prices in recent years slowed down the impact of alternative crops.

Area of intervention	2001	2002	2003	2004
Tocache	n.a.	95	124	225
Monzon	n.a.	10,935	10,659	11,325
Aguaytia	n.a.	256	42	45
Pichis	n.a.	118	118	140
Apurimac-Ene	12,600	14,170	14,300	14,700
Inambari-Tambopata	2,520	2,430	2,260	2,000
Bajo Huallaga	0	0	0	0

Table 25: Coca cultivation (ha) and areas of intervention of on-going alternative development projects



Source: National Police of Peru

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

#### 2.4 **REPORTED OPIUM POPPY CULTIVATION**

The UNODC-supported national illicit crop monitoring system has not yet established a reliable methodology for the detection of opium poppy in Peru. However, opium poppy cultivation was considered negligible in 2004. Opium poppy was mainly cultivation in the mountain range. A report of August 2004 of CADA (Alternative Development Assistance Body) mentioned that there would be 223 districts with potential land for opium poppy cultivation in the departments of Amazonas, Piura, Cajamarca, La Libertad and San Martín. There was also evidence of opium poppy cultivation in Pasco, Huánuco, Ayacucho and Huancavelica.

DIRANDRO estimated at around 1,500 ha the total opium poppy cultivation in Peru in 2004. A stable situation compared to the latest available estimate of about 1,400 ha of 2001.

Table 26:	Reported o	pium poppy	cultivation in Peru,	1994 - 2004 (	(ha)
-----------	------------	------------	----------------------	---------------	------

1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
475	599	649	720	652	873	748	1,361	n.a.	n.a.	1,447
Source F		n - n	ot availab	10						



Figure 22. Reported opium poppy cultivation in Peru, 1994 – 2004 (ha)

DIRANDRO reported annual opium latex yield of about 8 kg/ha, and a conversion rate of 10 kg of opium latex for 1 kg of heroin. Based on this estimates, heroin production would be around 1 metric tons. A relatively small production compared to neighbouring Colombia where heroin production is estimated at 5 metric tons in 2004.

To compare with other opium production estimates in Asia where a conversion rate of 10 kg of opium gum for 1 kg of heroin is usually used, the potential opium gum production in Peru would be around 10 metric tons, compared to 3,600 metric tons produced in Afghanistan in 2003.

In 2004, DIRANDRO reported the eradication of about 100 ha of opium poppy cultivation.

1998	1999	2000	2001	2002	2003	2004					
4	18	26	155	14	57	98					

Table 27: Reported opium poppy eradication in Peru. 1998 – 2004 (ha)

DIRANDRO reported that most of the opium latex production was transported by land in direction of Ecuador and by river towards Colombia. Seizure of opium latex were stable since 2000, amounting to 451 kg in 2004. There is no evidence of heroin production in the country, and there were very little seizure of heroin in 2004.

					, ,						
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	
Opium latex	24	37	7	12	66	508	244	234	433	451	
Morphine					1	15	11	6	0	0	
Heroin								16	4	1	

Table 28: Reported seizure of opium latex, morphine and heroin, Peru, 1995-2004 (kg)

Source: DIRANDRO

Figure 23. Reported seizure of opium latex, Peru, 1995-2004 (kg)



#### 2.5 REPORTED ERADICATION

In 2004, the Peruvian government reported the eradication of 10,257 ha of coca fields, 10% less than in 2003. It was the third largest level of eradication since 1999.





Most of the eradication took place in Alto Ucayali,. The eradication reported from Inambari – Tambopata took place in San Gaban.

Table 29: Reported eradication of coca fields by region in Peru, 2003 -2004 (ha)

	, <u>,</u>		
Region	2003	2004	% of 2004 total
Alto Ucayali	2,750	3,733	36%
Selva Central		1,806	18%
Aguatya	2,838	1,678	16%
Inambari - Tambopata		1,507	15%
Huallaga Central	4,654	1,282	12%
Alto Huallaga	887	252	2%
Apurimac	183		0%
	11,312	10,257	100%

Figure 25. Reported eradication of coca fields by region in Peru, 2004 (ha)



### Total reported eradication of coca cultivation (forced and voluntary), Peru 2004



Source: Government of Peru - National of monitoring system supported by UNODC

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

Of the total of 10,257 ha, about 75% were eradicated by CORAH (7,604 ha), the government entity in charge of forced eradication. CORAH (Control and Reduction of Coca Cultivation in Alto Huallaga) operates throughout the country under the responsibility of the Ministry of Interior. The Ministry provides CORAH with policy guidelines and the United States Embassy Narcotics Affairs Section (NAS) provides technical and financial support for eradication activities.

Eradication of fields of less than 2 years old was made by manually uprooting the coca bushes. For older fields, CORAH staff uprooted the coca bushes with a tool specially design for this and called 'cococho'. There was no chemical eradication in Peru.

The analysis of the reported eradication figures showed that 46% of the total eradicated areas by CORAH were abandoned or recently abandoned fields, indicating a serious effort to prevent the rehabilitation of coca fields. It is indeed less costly for the farmers to rehabilitate a coca field rather than established a new one. Most of the eradication of abandoned coca fields took place outside the 2004 survey area that focused on productive coca fields. This explained that eradication was reported outside the survey area in 2004.

Tahla 30.	Reported eradication b	w field type	$(C \cap R \Delta H)$
Table SU.	Reputed eradication b	y neiu type	(CORAN)

Field type	Total	%
Abandoned	1,805	24%
Recently abandoned	1,655	22%
In production	4,144	54%
Total	7,604	100%

CORAH also reported the eradication of coca seedlings for a total of 37,432 meter square. It was interesting to note that more than 50% of the eradicated seedlings came from San Gaban in Inambari-Tambopata region. This data was a testimony of farmers intentions to plant new coca fields, as indicated by the findings of the coca survey showing an increase in coca cultivation between 2003 and 2004.





In addition to eradication activities conducted by CORAH, DEVIDA also promoted voluntary eradication. The objective is to support farmers who have voluntarily eradicated their fields by providing economic compensation (US\$180/ha eradication) and alternative development support, including assistance to develop the social infrastructure of the areas. In 2004, 2,733 ha of coca cultivation were eradicated under such arrangements.

#### 2.6 REPORTED SEIZURE

According to report of DIRANDRO, seizures of cocaine paste and cocaine hydrochloride increased between 2003 and 2004. Seizures of coca paste increased from 4.4 metric tons to 6.3 metric tons (+45%) and seizures of cocaine hydrochloride from 3.6 metric tons to 7.3 metric tons (+ 104%). These increases corresponded to a raise in coca cultivation between 2003 and 2004, and tended to indicate that most of the new coca cultivation was not destined to the traditional use of coca leaves, but rather to the cocaine market.

Item seized	2003	2004
Destruction and seizure of coca leaf	1,328,347	916,024
Cocaine paste	4,366	6,330
Cocaine hydrochloride	3,574	7,303
Opium seed	0.7	7
Opium latex	182	285
Opium alkaloid	342	153
Morphine	0.04	0.09
Heroin	4.8	0.9
Marihuanna	19,276	1,513
Synthetic drugs (unit)	85	6
Permanganate potassium	277	100
Acide anhydrique	0	0
Destroyed coca paste installation	n.a	822
Destroyed clandestine laboratory		
processing coca paste	n.a	810
processing cocaine	n.a	11
processing opium/heroin	n.a	0
Total destruction clandestine laboratory	964	821
Destroyed clandestine airstrip	4	1

Table 31: Drug seized in Peru, 2003 – 2004 (kg or otherwise specified)

Source: DIRANDRO

## 3 METHODOLOGY

#### 3.1 COCA CULTIVATION

The monitoring of coca cultivation in Peru is based on the interpretation of various types of satellite images. For the 2004 census, a total of 17 SPOT5 images and 3 ASTER images taken between May and October 2004 were analyzed. The images covers a total of 45,900 square km over the known coca growing areas of Peru.

1) Identification and acquisition of the image

The 2004 Peru coca survey relied mostly on SPOT5 images, and to a lesser extent on ASTER images for the estimation of coca cultivation.

Sensors	Number of	Total area in	% of total
	image	square km	
SPOT 5 10-meter multi-spectral	16	31,500	68.6%
SPOT 5 5-meter panchromatic	1	3,600	7.9%
ASTER	3	10,800	23.5%
Total		45,900	100%

Table 32: Satellite images used for the 2004 survey in Peru

SPOT5 possesses very good characteristics for crop monitoring. In combination with the older SPOT4 satellite, the chances of acquisition of cloud free images are higher than with other sensors. In addition, due to an off-nadir viewing capability an area can be monitored more frequently. With a spectral sensitivity from the visible to the medium infrared and a spatial resolution from 2.5 meter (panchromatic) to 10 meter (multispectral), SPOT fulfils the requirements for vegetation monitoring.

The main disadvantage of this sensor is its relatively high price, which impedes the coverage of large areas on a regular basis. With a swath width is of 60 km, about 300 SPOT images would be necessary to cover the entire country. However, SPOT offers the possibility to purchase half or quarter of images. This option enabled to reduce the cost to cover the area of interest.

ASTER images consist of 16 spectral bands with a spatial resolution ranging from 15 to 90 meters. The monitoring of vegetation covers relies mostly on the spectral bands 1, 2 and 3 with a pixel size of 15 meter. ASTER has a swath width of 60 km.

ASTER Data are acquired only if a request has been submitted by a registered company. The project is not registered and relied on images programmed by registered customers. This constrain limited to only two the number of ASTER images used for the 2004 coca cultivation survey in Peru.

#### 2) Image pre-processing

The SPOT 5 images are received at the level 1A. Depending on the cloud covers and haze present on the image, the images are filtered with an convolution algorithm. If the study area is made of several images, the contrasts are levelled out.

The images were geo-referenced on the basis of ground control points from maps at the 1/50,000 scale and the 2001, 2002 ortho-rectified images.



## Satellite coverage of the coca survey, Peru 2004

Source: Government of Peru - National monitoring system supported by UNODC The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

#### 3) Definition of interpretation keys

The appearance of the coca fields on the satellite images depends on the field slope, the sun exposure (shaded or sunny areas of the satellite images) and the stage of development of the vegetation.

First the remote sensing experts defined the interpretation patterns of the different categories and stage of coca fields. Their experience enabled them to distinguish the following five patterns of coca cultivation:

#### a) Young coca field

This category corresponds to coca fields of about 12 months old. The coverage of coca foliage accounts for 20% to 40% of the spectral characteristics of these fields, while the remaining spectral characteristics come from the soil. As the soil spectral characteristics play an important part in the identification of these coca fields, ground information and previous year's mapping information are crucial.

#### b) Mature coca field

This category corresponds to coca fields from 12 to 24 months old and older. Three or four months after the harvest, these coca fields have a high coca foliage density and show a high level of contrast on the satellite images.

Generally speaking, the higher the density of coca plants, the higher the reflectance on the satellite image. It is therefore easier to identify coca fields in areas where density is high, like in Apurimac, than in areas where it is lower, like in Monzon and La Convencion-Lares.

#### c) Harvested coca field

This category corresponds to coca fields on which the leaves have been harvested and only nude plants and stems remain. Most of the spectral characteristics of these fields come from the colour of the soil. The identification and mapping of these fields therefore requires the use of additional information, such as the 2001 census, as well as field data on the surrounding environment.







#### d) Rehabilitated coca field

This category corresponds to abandoned coca fields recently rehabilitated. The rehabilitation process includes weeding and planting of new coca plants in addition to old coca plants. These coca fields can be productive in a very short time. The first harvest can take place as early as 3 to 4 months after the rehabilitation.

The spectral characteristics of these fields are the same as for mature coca, but the use of the 2001 coca mapping enables the identification of these rehabilitated coca fields.

#### e) Mixed crops

This category includes parcels where the coca crop, while maintaining its structure in the field (furrows and/or alternating lines), shares the ground with licit crops. Associated crops are generally annual agricultural products, such as maize and cassava.

The spectral characteristics of these fields are the combination of the spectral characteristics of the coca foliage, the associated crop and of the soil.





Once these patterns had been defined, coca fields were visually interpreted and their borders digitized on screen on a few sample areas. The resulting classification was printed at the scale 1/50,000 for field verification.

4) Field verification and correction of the interpretation key

The field work enabled to refine the interpretation key, and to improve the characterization of confusing land use, mostly shrubby areas ('purma'), annual crops with short vegetation period, small pastures and small cleared areas.

#### 5) Visual interpretation of coca fields

After the interpretation key had been corrected and refined, coca fields were classified visually on screen for the entire area of interest. The experts have acquired a good knowledge of the areas of interest during the field verification process and have long experience with the project. They also relied on the aerial photography at the 1/20,000 scale acquired in 1999 and 2000, as well as the previous year satellite images, to facilitate their interpretation.

#### 6) Verification flights

For some areas, the results of the visual interpretation is checked during over-flights. One flight was courtesy of NAS. The areas over-flown depend on the availability of planes and flights route. In 2004, a total of 22 hours of flights was performed.

#### 7) Correction for slope

In Peru, 90% of the coca fields are on slope steeper than 20 degrees. To improve the overall results, a digital elevation model based on 1/50,000 contour lines is used to correct the initial area with the inclination of the underlying slope.

Table 33: Cor	rection for slope
	Area (ha)
Initial interpretation	44,008 ha
After slope correction	50,258 ha

#### 3.2 OPIUM POPPY CULTIVATION

The UNODC-supported national illicit crop monitoring system has not yet established a reliable methodology for the detection of opium poppy in Peru and no data was available for 2004. Nevertheless, the level of opium poppy cultivation is considered negligible in Peru.

#### 3.3 YIELD AND PRODUCTION OF COCA LEAF

In 2001, UNODC carried out a first study of coca leaf yield in Peru. The characteristics and weight of fresh and sun-dried coca leaf were taken from thirteen fields This first study weighted the complete crop during each of the four annual harvests. This methodology required that staff remained in the field during the whole harvest. As security in the coca growing areas has deteriorated, remaining in the coca field for such a long period is now considered too risky.

In June 2003, UNODC initiated a second coca leaf yield study in Peru, this time based on brief field visits. The study could be completed in thirteen fields for each of the four or five annual harvests The latest harvest recorded was in January 2005.

Region	Locality	Number of harvests during which coca leaf were weighted
Alto Huallaga	Supte. Alto	5
	Castillo	5
	Nueva Libertad	4
	Uchiza	5
Apurimac	Naranjal	4
	Naranjal	4
	Matucana	4
	Sta. Rosa	4
	Sta. Rosa	4
	Sta. Rosa	4
La Convencion	Chahuares	4
	Pintobamba	4
	Isilluyoc	4
Total number of fields	13	

Table 34: Fields and harvests studied for the coca leaf survey 2003 - 2004

In each area, coca fields were selected to represent the prevailing local conditions of coca cultivation. The field selection took into account factors like slope, coca plant density and the use of fertilizers and insecticides, all of which impact on the coca yield. The fields had to be selected in accessible areas and the farmers had to give his approval for the work to take place. This approach could however bias the results. Future field work and research will be carried on to remove possible bias.

Field work for the yield assessment should take place when the coca fields are mature. Only that part of the field that was being harvested by the farmer was considered for the study. The coca leaves were either harvested by the farmers themselves or jointly with the surveyors.

Coca leaves were collected from plants of five plots of five to ten meters long, depending on the size of the field. The centre of the field determined the first sampling area. The other four were selected mid-way along the median of the coca field. As the coca plants are planted along regular lines, one sampled area is made up of coca plants along one furrow.



Tracing of dividing line

Location of sampled plots



For each plot of each field of each harvest, the fresh and dry harvests of coca leaves were weighted, the coca plants were counted and the distances between the left and right furrow were measured.

The following summary statistics were calculated for all the plots by field and by harvest:

#### Total Weight of Fresh Coca Leaf for studied plots by field and by harvest

TWFresh by field, harvest =  $\begin{bmatrix} PlotsSampled \\ WeigthFreshCocaLeaf \end{bmatrix}$  by field, by harvest

#### Total Weight of Sun Dried Coca Leaf for studied plots by field and by harvest

TWSun by field, harvest = [WeigthSunDriedCocaLeaf] by field, by harvest

#### Total Weight of Fresh Coca Leaf for studied plots in 100m by field and by harvest

TWfreshX100m <sub>by field, harvest</sub> = TWFresh \* 100 / [Number of plots Sampled \* Plot length]

#### Total Weight of Sun Dried coca leaf for studied plots in 100m by field and by harvest

TWSunX100m <sub>by field, harvest</sub> = TWSun \* 100 / [Number of plots Sampled \* Plot length]

#### Average Number of Furrows in 100m (ANF) by field and by harvest

ANF  $_{by field, harvest}$  = 100 / [Average of (distance between plant and left furrow, distance between plant and right furrow)]

#### Average Yield by hectare by Harvest

AYFresh<sub>by field, harvest</sub> = ANF \* TWFreshX100m

AYSun<sub>by field, harvest</sub> = ANF \* TWSunX100m

Exploratory and descriptive statistical analyses were conducted in order to identify basic field characteristics, coca leaf weights distributions, trends and possible outliers, which may cause bias to the final estimates. Eventually, fifty-five valid observations were included in the present estimation (24 observations in Apurimac, composed by 6 fields with 4 harvest each; 12 observations in La Convencion, composed by 3 fields with 4 harvest each; and 19 observations in Alto Huallaga, composed by 3 fields with 5 harvest each and 1 field with 4 harvest).

The sun-dried coca leaf were not dried in oven. The oven-dried weight was estimated by removing a constant 74% of humidity from the fresh weight. This humidity content was obtained by the US Department of State during the operation breakthrough.

Confidence intervals are desirable since the estimate of the mean varies from sample to sample. The confidence interval gives an indication of the level of uncertainty there is in the estimate of the true mean.

Confidence boundaries at the  $\alpha$  level are defined as follows:

$$ar{Y} \pm t_{(lpha/2,N-1)}s/\sqrt{N}$$

where  $\bar{Y}$  is the sample mean, **s** is the sample standard deviation, **N** is the sample size,  $\alpha$  is the desired significance level, and  $t_{\alpha/2,N-1}$  is the upper critical value of the normal distribution.

#### 3.4 PRICES

Prices of sun-dried coca leaf and other commodities are collected through a network of 13 collection points located in the following areas: Aguaytia (1), Apurimac (3), Inambari (3), Monzon (2), Tocache (1), and Uchiza (3).

Prices are collected once a month by project staff through semi-structured interviews of key informants selected among farmers, storekeepers and people who participate in the production and distribution of illicit drugs.
## 4 ANNEX

Montly farm-gate price of coca leaf in Peru (1990 - 2004)

Results of classification on SPOT5 images in Apurimac

Results of classification on SPOT5 images in Alto Huallaga (except Monzón)

Results of classification on SPOT5 images in Monzón

Results of classification on SPOT5 images in La Convencion

Results of classification on SPOT5 images in San Gaban

Results of classification on SPOT5 images in Inambari

Monthly farm-gate price of coca leaf in Peru 1990-2004 (US\$/kg)

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	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
January	0.7	0.8	1.1	4.4	1.5	3.0	0.4	0.6	0.6	1.8	1.6	2.0	2.6	2.3	2.5
February	0.9	1.6	1.7	3.5	1.6	3.0	0.4	0.6	0.7	1.4	1.3	2.1	2.6	2.4	2.6
March	0.8	1.6	1.7	1.7	1.6	2.6	0.4	0.6	0.7	1.7	1.6	2.1	2.3	2.0	2.6
April	0.5	1.5	2.6	1.3	1.6	1.7	0.5	0.6	0.6	1.6	1.7	2.3	2.2	1.9	2.4
May	0.5	1.5	1.9	1.7	1.6	0.9	0.5	0.6	1.0	1.6	1.9	2.4	2.3	1.9	2.6
June	0.4	1.7	2.2	1.3	1.8	0.7	0.7	0.6	1.0	1.4	2.0	2.5	2.5	1.8	2.5
July	0.4	1.6	2.2	1.0	2.6	0.4	0.9	0.9	1.1	1.3	2.1	2.5	2.3	2.1	2.9
August	0.4	1.5	3.0	1.9	3.0	0.4	1.0	1.3	2.1	1.8	2.3	2.7	2.9	2.1	3.2
September	1.2	1.7	4.4	2.1	3.0	0.4	1.0	1.3	2.0	2.2	2.7	2.7	2.8	2.2	3.1
October	1.6	1.7	2.6	2.1	3.9	0.4	1.0	0.9	1.5	2.5	2.8	2.5	2.5	2.4	3.2
November	0.9	1.3	2.6	1.3	4.4	0.4	0.6	0.7	1.4	2.0	2.2	2.0	2.4	2.2	3.5
December	0.9	1.0	3.5	1.3	3.0	0.4	0.6	0.7	1.7	1.6	1.9	1.9	2.3	1.9	2.7
Annual															
Average	0.8	1.5	2.5	2.0	2.5	1.2	0.7	0.8	1.2	1.7	2.0	2.3	2.5	2.1	2.8
US\$/kg															

Monthly farmgate price of coca leaf in Peru 1990 - 2004 (US\$/kg)

Source: UNODC Alternative Development Programme



**Result of classification on SPOT 5 images in Apurimac 2004** 

Source: UNODC 2004





Source: UNODC 2004

## Result of classification on SPOT 5 images in Monzon 2004



Source: UNODC 2004



Source: UNODC 2004



Result of classification on SPOT 5 images in San Gaban 2004

Source: UNODC 2004

## Result of classification on SPOT 5 images in Inambari 2004



Source. UNODC 2004